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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/668,947	09/23/2003	Margaret Ghiron	SIO-0106	3887

7590 06/21/2005

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EXAMINER	
PAK, SUNG H	

ART UNIT	PAPER NUMBER
2874	

DATE MAILED: 06/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/668,947	GHIRON ET AL.	
	Examiner	Art Unit	
	Sung H. Pak	2874	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 April 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13,15-20 and 22-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13,15-20 and 22-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Applicant's amendment filed 4/13/2005 has been entered. Claims 1-13, 15-20, 22-24 are now pending.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-13, 15-19, 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Deliwala (US 2003/0118306 A1) in view of Rigrod (US 3,883,221).

Deliwala discloses an optical device with limitations set forth in the claims of the instant application, except it does not explicitly teach the use of a cavity formed *within the base surface* of a prism coupler.

Specifically, Deliwala discloses: a silicon optical waveguide formed in a surface layer of a silicon-on-insulator (SOI) wafer ('106' Fig. 53); a silicon-based prism coupler permanently attached to the SOI wafer in a manner such that first, base surface of the said prism coupler is disposed substantially parallel to and mated with an upper waveguide surface of the SOI wafer, (Fig. 53, paragraph 0375); the refractive index of the silicon-based prism coupler at least equal to the refractive index of the silicon optical waveguide (paragraph 0350); an evanescent coupling region disposed between the silicon-based prism coupler and the silicon optical waveguide ('5106' Fig. 53); wherein the thickness of the silicon optical waveguide is less than 1 μm (paragraph 0350); wherein the optical waveguide is configured to support propagation of a single mode optical signal (paragraph 0468); wherein the optical waveguide comprises a multi-layer structure of silicon-based layers, separated by relatively thin dielectric layers (paragraph 0124); wherein the species and concentration of dopants included in the optical waveguide are specified such that the refractive index of the prism coupler is at least equal to the refractive index of the optical waveguide (paragraph 0166 and 0350); wherein the evanescent coupling region comprises a cavity or a thin film layer of a material comprising a refractive index less than the refractive index of both the prism and the optical waveguide (paragraph 0352- since the evanescent coupling region is air, the refractive index of this region is inherently less than the refractive index of prism and the waveguide); wherein the evanescent coupling layer is formed as a surface layer across the first base surface of the prism (Fig. 54), and as a surface layer above the optical waveguide (Fig. 53); wherein the evanescent coupling region may be a multi-layer structure ('5106' Fig. 53); wherein the evanescent coupling region comprises a layer of constant

thickness (Fig. 53); wherein the evanescent coupling region comprises a layer of tapered thickness (Fig. 55).

On the other hand, Rigrod explicitly teaches a prism coupler having at least one cavity (plurality of cavities) formed within the base surface of the prism (column 2 lines 28-32; column 3 lines 54-60), which truncates an incoming optical beam (column 3 lines 54-60). Having the cavity region directly formed on the prism element would be advantageous and desirable because cavity dimensions and shapes may be more easily controlled during the manufacturing process of the device. By contrast, forming precisely dimensioned cavity in-between the prism surface and the waveguide surface is significantly more difficult, because accuracy of the dimension will depend on the attachment process involved in fixing the prism and the planar waveguide.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the device of Deliwala to a cavity formed *within the base surface* of a prism coupler, as taught by Rigrod.

Regarding claims 16-18, these claims are apparatus claims reciting process limitations. It has been determined that, for product claims, "determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). See also MPEP 2113. Since Deliwala teaches all the structural limitations of claims 16-18, the claims are rejected based on Deliwala.

Regarding claim 5, Deliwala, in view of Rigrod, render all the limitations set forth in the claims obvious as discussed above, except it does not explicitly teach the use of anti-reflective coating on the surface of the prism.

However, the use of anti-reflective coating on optical coupling prisms is well known and common in the art. The use of anti-reflective coating advantageously lowers coupling loss due to signal back-reflection during the coupling process. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the Deliwala device to have anti-reflection coating on the prism surface.

Regarding claim 12, Deliwala, in view of Rigrod, render all the limitations set forth in the claims obvious as discussed above, except it does not explicitly teach the use of silicon dioxide evanescent coupling layer.

However, silicon dioxide coupling layers are well known and common in silicon optical waveguide devices. The use of silicon dioxide coupling layer is advantageous and desirable because it provides suitable refractive index values for efficient light coupling. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the Deliwala device to have silicon dioxide coupling layers.

Claims 20, 22, 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Deliwala (US 2003/0118306 A1) in view of Rigrod (US 3,883,221) as applied to claims above, and further in view of Minami et al (US 6,021,239).

Deliwala, in view of Rigrod, render all the limitations set forth in the claims obvious, as discussed above. However, it does not explicitly teach the use of trapezoidal prisms.

On the other hand, Minami explicitly teaches the use of trapezoidal prisms for light coupling (Fig. 1-2). The use of trapezoidal prisms is advantageous and desirable because it allows for optimal coupling angle which enhances coupling efficiency of the device. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the Deliwala device to use trapezoidal prisms.

Response to Arguments

In view of the amendment and applicants' arguments for patentability of pending claims, the previous ground of rejection is hereby withdrawn. Upon further consideration, however, a new ground of rejection is provided in this office action.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sung H. Pak whose telephone number is (571) 272-2353. The examiner can normally be reached on Monday- Friday, 9AM-5PM.

The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Sung H. Pak
Patent Examiner
Art Unit 2874

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